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COMPUTERS AND AUTOMATION

CYBERNETICS • ROBOTS • AUTOMATIC CONTROL

Vol. 2, No. 7

Duke University Library
OCT 8 1953
Durham, N. C.

OCTOBER, 1953

THE EDITOR'S OFFICE

Who's Who in the Field of Computers and Automation. This issue contains the seventh and last instalment of the Who's Who that we have published. One reader has suggested that we bring it up to date once a year, and then publish the whole Who's Who in alphabetical order in a single issue, omitting everything else. Any other suggestions or comments?

Committees Studying Applications of Automatic Computing Equipment. We know of at least three committees studying applications of electronic techniques for handling information: a committee of the Life Office Management Association; a committee of the Society of Actuaries; and a committee in the fire and casualty insurance industry. There probably are more. We should be glad to know the details about all such committees; by publishing their name and their secretary's address in COMPUTERS AND AUTOMATION, we may make it easier for them to receive information.

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Back Copies. Issues October, 1952, to date are available. Price $1.25 each; or a subscription may be specified to begin with a stated issue. See more information on page 31.

Manuscripts. We desire to publish articles that are factual useful, understandable, and interesting to many kinds of people engaged in one part or another of the field of computers and automation. In this audience are many people who have expert knowledge of some part of the field, but who are laymen in other parts of it. Consequently, a writer should seek to explain his subject, and show its context and significance. He should define unfamiliar terms, or use them in a way that makes their meaning unmistakable. He should identify unfamiliar persons with a few words. He should use examples, comparisons, analogies, etc., whenever they may help readers to understand a difficult point. He should give data supporting his argument and evidence for his assertions. An article may certainly be controversial if the subject is discussed reasonably.

Ordinarily, the length should be 1000 to 4000 words, and payment will be $10 to $50 on acceptance. A suggestion for an article should be submitted to us before too much work is done. To be considered for any particular issue, the manuscript should be in our hands by the 5th of the preceding month.

Vol. 2, No. 7 October, 1953

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COMPUTERS IN THE FACTORY

by David W. Brown, Ultrasonic Corporation, Cambridge, Mass.

The factory controlled by an automatic computer is a concept familiar to many people. Any faithful reader of the comic strips has seen blueprinted there robot machines with giant electronic brains, turning out widgets by the barrelful at a trifling cost. Yet a quick look at American industry today shows that despite the present advanced state of computer design, and despite highly automatic machinery in some mass-production and process industries, we have nothing yet approaching a computer-controlled factory. The fact is that the computer is not yet welcome on the production floor. Manufacturers do not doubt that the computer-controlled factory can make parts; their doubt is that it can make money. Showing that a computer can earn its keep in the factory has become a major challenge in the computing machinery field.

Some experiments have already been made on the application of computers to the control of metal-working machinery in a factory. Although computer-controlled machine tools have not yet been extensively shop-tested, experience with prototype machines suggests that under proper conditions a computer control can: 1-save engineering time; 2-reduce shop labor costs; 3-improve product quality; and 4-increase production.

Several factors, however, are tending to retard the introduction of computers into metal-working machinery. Among these are: 1-unfamiliarity of manufacturers with the capacities and limitations of computers; 2-unfamiliarity of computer engineers with metal cutting techniques; and 3-high cost of developing special-purpose computer controls. Nevertheless, as manufacturers gain experience with computers, we can expect that these retarding factors will decrease in importance.

Actually, certain analog computing components have been accepted in the shop for many years. All servo controls of speed and position, for example, involve facilities for performing summations. Many automatic controls for contour tracing include apparatus which regulates the speed of two machine slides so that the vector velocity of the cutting tool is of constant magnitude regardless of its direction.

Recent developments have shown, however, that more elaborate computers can be effective in governing all the operations of a metal working tool. Control devices having a digital data input, for example, offer several fundamental advantages in manufacturing applications. Usually a metal part is entirely described by means of numerical dimensions. If the part is to be cut, the rate of tool feed is also specified by a number. Operations in a sequence, and tool sizes may also be designated by numbers. The inherent capability of the digitally controlled machine is that it will take in all of these numbers and, after appropriate manipulations, reproduce them automatically, to predictable tolerances, in the finished part. Much of the engineering drawing, hand labor, and measurement of existing manufacturing methods are thereby eliminated. The speed, coordination and accuracy of the finest machinist are readily exceeded, and the machine runs tirelessly for three shifts a day, with almost no human intervention.

The advantages of digital control, however, are not obtained without cost. For example, we often find upon analysis that a machinist has been supplying control information to his machine "by eye" or "by feel." Design and engineering procedures must be revised if this information is to be furnished to a computer in digital form.

Computers and their associated servomechanisms for driving machines involve a quantity and variety of circuitry larger than that found in most metal-working plants. Consequently, special maintenance personnel are often required. Finally, and most important, a large amount of engineering is at present required to develop a computer control for a particular machining application and a particular machine tool. The original cost of computer control equipment, therefore, is usually very high. These factors have combined so far to restrict the use of computer controls to those applications where the abilities of the computer are especially valuable.

The principal problem facing builders of computer controls today, therefore, is to discover which metal-working applications are economically most favorable for their equipment. Two methods of solving this problem have been tried: 1-build a promising control unit, and then see where it can be used; and, 2-find a promising application, build a control to meet it, and then try to find other users with similar applications.

Neither method has been entirely successful, but several interesting prototype controls have been produced.

The first computing machine tool control to be publicly announced was built by Arma Corporation. Arma built the device on its own initiative in 1950 to demonstrate a commercial application of the computer components which it had been selling to the military services for many years. The control device, called the ArmaMatic, directed the operation of a lathe. Although it had a digital input, the ArmaMatic was primarily an analog device. For each cutting step, and for each machine slide, feed rates and "stop" locations were specified by numbers coded into a wide punched paper tape. As soon as the tape was sensed by the control, the coded numbers were converted to command voltages. The machine tool was then driven until these voltages were matched by voltages appearing on induction generators and potentiometers attached to the machine slides themselves. Control tapes for simple work could be prepared in less than 30 minutes, and the machine was said to reproduce diameters accurately within 3 ten thousandths of an inch. Unfortunately, an increase in priority orders resulting from the Korean War forced Arma to turn its attention from the ArmaMatic, and there is no indication that this promising device has ever been put into actual use.

Another group of computing controls now in operation includes a device built by Daco Machine Company of Brooklyn, New York, a cam-milling control built by Bell Telephone Laboratories for the Navy, and a non-circular gear-cutter control devised by Dr. F. W. Cunningham of Stamford, Connecticut. This group of controls represents a sharply different approach to automatic machine control. Each control unit has no computing apparatus in it but each requires that computing apparatus be used in preparing its input data.

In each of these systems, digital input data is coded and recorded on punched tape or film. The presence of a hole in the tape or a spot on the film in a given location merely causes a certain element of the machine tool to advance one unit in a predetermined direction. Such a scheme results in comparatively simple apparatus for machine control, but it does require the preparation of a vast amount of input data. In order that lack of precision of the input data shall not contribute appreciably to errors in the finished work, the unit of advance in such a system must be smaller than the tolerance permitted in the machined part. Thus, if a part is to be made to a tolerance of thousandths of an inch, at least one thousand input commands must be programmed in tape for every inch of machine travel!

Auxiliary computing equipment is necessary in such a system to carry the programming burden. Cunningham found that the programming of a single non-circular gear required the encoding of nearly 20,000 film spots, and that the computations involved represented a week's work for a skilled calculator. Consequently, Cunningham is currently devising a computing system to "automate" the calculating process. In similar fashion, input data for the Daco device is prepared with the assistance of a special desk calculator originated in the H. H. Cousins Co. of New York, N. Y. In the case of the Bell cam-milling control, which is operated by the University of Texas, the University computes the location of about 1,000 points along the surface of the cam, Then an additional 23,000 points are determined by processing the original data in an interpolating computer located at the Naval Research Laboratory in Washington, D. C.

Simple digital machine controls of this type may be economically desirable when one programming computer may prepare input data for many machine tools. Some inconvenience may result if the data must be prepared and used at widely separated locations, but this problem becomes small if the machine tool can be operated a long time with each set of programmed data. On the other hand, in certain classes of job-shop work, such as tool-making, it is exceptional to make more than one or two parts to the same specification. Whenever parts are made on such a basis, it is apparent that a large amount of specification data must be prepared, and economy dictates that the cost of data preparation must be kept as low as possible. In such a case, a considerable amount of computer apparatus within the control itself is justified. A digital machine control suited to very small lots, then, tends to require only a minimum of input data, supplying whatever additional information it needs by means of its own built-in computing equipment.

The M.I.T. Servomechanisms Laboratory, working under the sponsorship of the Air Materiel Command of the U. S. Air Force, has developed a control system of this type for a vertical spindle milling machine. By means of this development, M.I.T. sought to study and to demonstrate the application of digital control techniques to certain problems of die-sinking and forging-finishing which are common in the aircraft industry.

The M.I.T. device controls all three slides of the milling machine. For each straight-line motion of the milling cutter, the distance to be traveled is broken into x, y and z components. Input data for each motion consists of three component distances, punched in tape in binary form, plus a coded number representing the time allowed to complete the motion. Having sensed this data, the control apparatus performs first order interpolation. By means of a frequency dividing network, a series of command pulses are sent out representing x, y and z motions. Each pulse represents a movement of one half-thousandth of an inch. These commands are such that if executed without error, they would cause the x, y and z machine slides to move in coordination so as to reproduce the required tool motion at the required rate, never deviating from a straight line by more than half a ten thousandth of an inch. It is evident that the output of the interpolator in the M.I.T. device is information in a form very similar to that of the inputs in the Daco, Bell and Cunningham controls.

In the M.I.T. control, digital summing registers are also used to derive continuously the difference between the number of command pulses received from the interpolator and the number of similar pulses received from devices measuring actual motion of the machine. The computed differences are converted to analog voltages which serve as the error signal inputs to the machine drive servos. It is significant that this method of control postpones conversion to analogue data-handling as long as possible. The percentage errors characteristic of analog components are applied only to the servo error, which is a very small fraction of an inch, rather than to the total travel of the machine, which is as much as sixty inches. A high order of precision is thus made possible.

A digital machine control capable of third order interpolation has been built by the Lewis Flight Propulsion Laboratory of the N.A.C.A. This control, which operates a milling machine, was devised to meet the Laboratory's continuing need for a wide variety of precisely made experimental turbine blades. For each blade cross-section, the position of the center of the milling cutter is specified in polar coordinates at about fifty points around the blade. The function of the control unit is to drive the milling cutter in a path which connects these points in a smooth curve. (If first order interpolation were used, as in the M.I.T. system, the points would be connected by straight lines, and the resultant blade shape would be a polygon.) In order to achieve a smooth curve, a high order of interpolation is necessary. Interpolation is accomplished by using three precision Kelvin-type ball-disc integrators to generate an interpolation polynomial, the constants of which may be expressed in terms of the fourth differences of the specified polar radii. The interpolating process is said to contribute an accumulated error of about a tenth of a per cent for a full interpolation cycle. The output shaft of the interpolator provides an analog command signal for a servomechanism which drives the machine tool.

What do controls like these cost? No prices have been set, but those who have gained experience with experimental units are willing to make estimates. Made today in very small quantities, a single-motion positioning control, the simplest of digital input devices, might sell for about $5,000. A more elaborate unit, like a two-motion continuous interpolating control, might run around $25,000. These prices, furthermore, do not take into account the cost of developing a prototype unit of each type, a cost which should amount to at least three times the cost of the first duplicate unit.

The inclusion of a computer control at least doubles the price of a machine tool. There is no reason to doubt that experience will eventually reveal short-cuts and production techniques through which the price of computer controls can be reduced. Certainly this has been the case with other electrical products. In the meantime, however, manufacturers of computer controls must search for applications where the abilities of the computer are worth enough to make the computer pay for itself quickly at today's prices.

Surprisingly, a number of such applications have already been found. As the list of existing control units would suggest, the most successful applications seem to involve the accurate machining of small numbers of intricate parts. Work completed at M.I.T. for example, suggests that computer controls could radically reduce the cost of milling certain steel and aluminum forgings included in current military aircraft. One manufacturer of precision cams estimates that a computer control will reduce his cam engineering costs by as much as 30%, and production costs by as much as 50%. A large electronics manufacturer has built his own card-operated punch press for about $20,000 and expects to write his investment off in less than five years.

These experiences, plus increasing interest of all industries in automatic production, have caused both machinery and electronics manufacturers to devote more and more attention to computer controls. Although the machine tool industry is inclined to be highly secretive about new product developments, there are some hints of the extensive activity now taking place. At least two machine tool builders have constructed prototype computer controls in their own laboratories, and others have done some work on components. At least four other machine tool builders have contracted with outside suppliers or educational institutions for design study work in this field, and a number of potential users of computer controls have contemplated similar steps. In addition, many manufacturers of computers have undertaken design and developmental work in the machine tool field. Among these are Arma Corp., Beckman Instrument Company, General Electric Company, Hillyer Instrument Company, Hughes Aircraft Corporation, Sperry Corporation, and Ultrasonic Corporation.

The knowledge which will result from this activity is sure to accelerate the introduction of computers to the metal-working shop. As the capabilities and limitations of computer controls become more widely known, manufacturers will become aware of the savings that can be made by use of such equipment in their own shops. In similar fashion, computer builders will learn to spot those applications which will be most profitable to the user. As soon as a sufficiently broad application is found for computer control, the economies of high production will make themselves felt, and the cost of the computers will fall to levels comparable with those of conventional control equipment. Low cost in itself will encourage further sales, and computers will tend to become standard shop equipment.

Fully automatic factories are, of course, the objective of every builder of computer controls. That goal is still very far away, but the road to it is now mapped.

PATENTS

by Hans Schroeder, Milwaukee, Wisc.

Compilation of patents pertaining to computers and associated equipment, from the Official Gazette of the United States Patent Office, issued bearing dates as stated. Each entry is arranged in the following order: patent number / inventor(s) / assignee / invention.

July 14, 1953: 2,645,419 / R L Gourdon, Paris, France / Société Anonyme dite: Centre d'Etudes M B A, Paris, France / Item and total printing mechanism for calculating machines.

2,645,420 / W Hatton, Great Neck, N Y, L B Haigh, West Orange, N J, and L Kozma, Budapest, Hungary / International Standard Electric Corp, N Y / Electric calculating system using teletypewriter for input and output.

2,645,712 / J A Rajchman and M H Mesner, Princeton, and M Rosenberg, Trenton, N J / RCA / Circuit for reading information from selected areas of a storage tube.

2,645,724 / J A Rajchman, Princeton, N J, and E Stemme, Stockholm, Sweden / RCA / Means for indicating condition of memory elements; elements are selectively probed by an electron beam; resulting visual indication (or absence of it) is observed by a photoelectric cell.

2,645,734 / J A Rajchman, Princeton, N J / RCA / Storage tube with electron multiplying and selecting electrodes.

2,645,742 / A H Reeves, London, England / International Standard Electric Corp, N Y / Cold-cathode discharge tube with a plurality of electrodes for generating a train of pulses after a single trigger pulse.

July 21, 1953: 2,646,534 / J C Manley, Barrington, R I / Reconstruction Finance Corp, Boston, Mass / Ring-counter, using gas-filled diodes and unilateral coupling between successive tubes.

July 28, 1953: 2,646,924 / O H Schuck, Minneapolis, Minn / Minneapolis-Honeywell Regulator Co / Analog computer to calculate time of arrival of aircraft.

2,646,925 / M Bevis, Oak Ridge, Tenn / US Atomic Energy Commission / Electronic means for integrating the intervals of duration of pulses.

2,646,926 / L L Young, Pasadena, Calif, and R M Wilmotte, Washington, D C / Padevco, Inc, Washington, D C / Reversible electronic multiple-decade ring counter.

2,647,221 / C R Williams, Hawthorne, and C S Andersen, Bell, Calif / Northrop Aircraft, Inc., Hawthorne, Calif / Bistable flip-flop circuit using a single cold-cathode tube having two anodes.

2,647,236 / J A Saunderson, V J Caldecourt, and E W Peterson, Midland, Mich / Dow Chemical Co, Midland, Mich / Electrical circuit for measuring the ratio of two potentials.

August 4, 1953: 2,647,689 / A W Bowyer and J R Cartwright, Letchworth, England / British Tabulating Machines Co, London, England / Keyboard operated decimal to binary converter; output is by punch.

2,647,995 / A H Dickinson, Greenwich, Conn / IBM Corp, N Y / Bistable circuit using a single triode and a two-terminal device having positive and negative resistance characteristics.

2,647,997 / S B Williams, Chevy Chase, Md / National Cash Register Co, Dayton, Ohio / Biquinary counter using a plurality of vacuum triodes.

August 11, 1953: 2,648,598 / C N Hickman, Jackson Heights, N Y / Bell Tel Labs, NY / Magnetic recorder in which magnetic ribbon is scanned transversely by a rotating head.

2,648,725 / E P G Wright and D A Weir, London, England / Standard Telephone and Cables, Ltd, London, England / Apparatus for decoding characters in printing-telegraph code using cold-cathode gas tube flip-flops.

THE FLOOD OF AUTOMATIC COMPUTERS

by Neil Macdonald

Ten years ago who would have predicted that by 1953 there would be over 100 kinds of automatic computers? and probably well over 1000 of such machines in existence and operating? Almost no one -- certainly not such leading pioneers as Dr. Howard H. Aiken of Harvard, Dr. Vannevar Bush of Mass. Inst. of Technology, or Dr. George L. Stibitz then of Bell Telephone Laboratories -- would ever have made any such prediction.

What is the extent of this flood of automatic computers, and what are the reasons for it?

Types of Automatic Computers

Elsewhere in this issue is published a list of 107 types of automatic computers, for which the editors of COMPUTERS AND AUTOMATION have obtained specific information. But we know that there are a number of types of automatic computers not yet included in this list. Doubtless many types of fire control automatic computers, both general purpose and special purpose, which are under various degrees of military classification, are missing from this list. Automatic computers in foreign countries are probably not as well reported as they could be; in an article published in the last issue, T. Fortuna reported the existence of several automatic computers in the Soviet Union -- not yet entered in this list for lack of specific information to date.

Other Computers Being Started

As far as information reaching us reveals the true situation, 1953 is relatively only a beginning. From month to month, more manufacturers apparently say to themselves "automatic computing equipment — hmm! — looks like a good field to go into — let's investigate to see if we should enter it." The spirit is infectious. Groups of engineers who have worked together on a computer project within one organization, rather often it seems, secede and go into business for themselves. Some of these new firms grow soundly, but most of them apparently are bought up and become new divisions of larger and stronger organizations.

Resources Invested

To construct an automatic computer is not easy. It takes a considerable amount of engineering effort, and payment of a considerable bill for materials and labor, in order to construct an automatic computer that will do useful work. In fact, it is rather easy to estimate that well over $100 million, and perhaps over half a billion dollars has been spent in the last ten years towards the construction of automatic computing equipment. Why?

Basically, there are three main facts, two old and one new. First, that information is useful. Second, that interesting, important, and valuable information can be derived by reasonable processes from other information. And third, that very often machines can automatically perform reasonable processes much faster and much more reliably than human beings ever can.

This last fact was proved beyond the shadow of a doubt by the construction and successful operation of the first highly general and truly automatic computers: 1942, the Mass. Inst. of Technology Differential Analyzer No. 2; and 1944, the Harvard IBM Automatic Sequence Controlled Calculator, Mark I.

This third fact, really, when known was the giving away of a vast secret, "it can be done". In the same way, the use of a certain explosive at Hiroshima in August 1945 gave away the vast secret of the atomic bomb, "it can be done". The rest is essentially detail, deciphering the cipher of Nature, knowing that "it can be done". And non-American scientists are likely to think harder than American scientists, because they have fewer resources and must accordingly think harder: witness the British commercial jet planes.

With the knowledge that machinery for automatic handling of information was possible, and in addition the realization that electronic speeds could be employed for this purpose (1946, the Moore School's Eniac), a great many people began to look at information with new eyes. Why rely on "armchair" judgments if you could compute? Why rely on the estimates of men with "experience", if you could replace the estimate with something more accurate? Why give up on the problem of shooting down an attacking plane, if you could automatically aim your defending guns?

In fact, what are all the places in our society where "finished" information is wanted, and how can we obtain this information easily by automatic processing of "raw" information?

Realizing the answers to these questions has led to the great tide of resources, funds, scientists, technicians, materials, human attention, interest, and support, and thus the present flood of automatic computers. Probably it resembles in many ways the development of the automobile industry in its early years.

Which Way is the Flood Going?

The automobile business contains many fewer manufacturers and models, though many more cars, nowadays than it did thirty years ago. Is the same trend likely for automatic computers?

It is hard to be certain, but it does seem likely that the same forces will operate. Clearly, many of the types of automatic computers built by university laboratories are one of a kind, and will never be repeated. But the problems of computing information have much more variety to them, it seems, than the problems of transporting human beings and baggage over a road, and so the number of types of automatic computers is likely to remain relatively high.

Price

As in the automobile business, the cost of computers relative to the cost of other commodities will almost certainly go down -- there is plenty of competition to produce that effect — and there are no indications so far that restraints because of patent infringements and lawsuits are likely to be serious.

It is a question whether the price of an automatic computer will go so low that it will be less than the cost of materials to a university laboratory; but this has happened for desk calculators, which no university laboratory dreams of constructing.

Size

In the case of motor cars, there are natural limits to size. A car has to be large enough to hold at least one person; and it has to be small enough to go on a road, under a bridge, and through a tunnel. But with computers, there are hardly any limits to reduction in size, because the marks or equipment that represent information inside a computer can be made extremely small. There is certainly no advantage in itself to large size and large power requirements. Almost certainly, the most elephantine of automatic computers has already been constructed.

Reliability, Speed, and Capacity

Just as in the development of motor cars, the reliability, speed, and capacity of automatic computers is bound to increase, as a result of discoveries, increased know-how, and the force of competition.

It is quite likely also that the distinction between analog and digital computers will largely disappear; one and the same computer will be able to operate in either fashion, choosing according to its own convenience in the problems to be solved. It is also likely that improved interchangeability of parts, and wider intercommunication among computers, will be developed — so that good results obtained in one computing system will be quite easily available (both physically and mentally) in another computing system.

Finally, we can be sure that the number of automatic computers -- or more exactly, the number of pieces of equipment capable of handling information automatically — will increase from thousands to millions.

ROSTER OF ORGANIZATIONS IN THE FIELD OF COMPUTERS AND AUTOMATION

(Edition 11, supplement, information as of Sept. 10, 1953)

The purpose of this Roster is to report organizations (all that are known to us) making or developing computing machinery, or systems, or data-handling equipment, or equipment for automatic control and materials handling. Each Roster entry when it becomes complete contains: name of the organization, its address, nature of its interest in the field, kinds of activity it engages in, main products in the field, approximate number of employees, year established, and a few comments and current news items. When we do not have complete information, we put down what we have.
Note: Beginning with the September issue, makers of components only are transferred to another list, which see.

We seek to make this Roster as useful and informative as possible, and plan to keep it up to date in each issue. We shall be grateful for any more information, or additions or corrections that any reader is able to send us.

Although we have tried to make the Roster complete and accurate, we assume no liability for any statements expressed or implied.

This edition contains only revisions or additions as compared with the editions published in the April, May, July, and September, 1953, issues of COMPUTERS AND AUTOMATION, vol. 2, no. 2, 3, 4, and 5.

Abbreviations

The key to the abbreviations follows:

Size
- Ls Large size, over 500 employees
- Ms Medium size, 50 to 500 employees
- Ss Small size, under 50 employees (No. in parentheses is approx. no. of employees)

When Established
- Se Organization established a short time ago (1942 or later)
- Me Organization established a "medium" time ago (1923 to 1941)
- Le Long established organization (1922 or earlier)

Interests in Computers and Automation
- Dc Digital computing machinery
- Ac Analog computing machinery
- Ic Incidental interests in computing machinery
- Sc Servomechanisms
- Cc Automatic control machinery
- Mc Automatic materials handling machinery

Activities
- Ma Manufacturing activity
- Sa Selling activity
- Ra Research and development
- Ca Consulting
- Ga Government activity
- Pa Problem-solving
- Ba Buying activity

(used also in combinations, as in RMSa, "research, manufacturing and selling activity")

*C This organization has very kindly furnished us with information expressly for the purposes of the Roster, and therefore our report is likely to be more complete and accurate than otherwise might be the case. (C for Checking)

*A This organization has placed an advertisement in this issue of COMPUTERS AND AUTOMATION. For more information, see their advertisement. (A for Advertisement)

Audio Instrument Co., Inc., 133 West 14 St., New York 11, N. Y. *C
Electronic, mechanical, and optical analog computers. Precision electronic instruments; fire control equipment; logarithmic amplifiers; specialized passive computer which corrects for film nonlinearity in photometric work, etc. Ss(10) Se(1949) DACSc RCSa

Automation Consultants, Inc., 1450 Broadway, New York 18, N. Y.
Consultants in electronic systems and devices, including automatic information-handling. Ss Se(1953) DSCc CPBa

Berkeley Division, Beckman Instruments, Inc., 2200 Wright Ave., Richmond, Calif.
EASE computer (Electronic Analog Simulating Equipment) for solving equations, simulating systems, etc. Se Ac RMSa

Daco Machine Co., Brooklyn, N. Y.
Computing controls for machine tools. Cc RMSa

Intelligent Machines Research Corp., 134 So. Wayne St., Arlington, Va. *C, *A
Devices for reading characters on paper, etc. Pattern interpretation equipment. Sensing mechanisms. Digital computer elements. Ss(6) Se(1951) Dc RCMSa

Laboratory for Electronics, 51 Pitts St., Boston 14, Mass. *C, *A
Analog and digital computers, special computers to suit customer requirements, delay lines (mercury, quartz), plug-in packages for computer applications, etc. Ls(700) Se(1946) DAc RMSa

The W. L. Maxson Corporation, 460 West 30 St., New York 1, N. Y., and elsewhere.
Servomechanisms, analog computers, and digital computers, for fire control, navigation, etc. Ls(3000) Me(1935) DASc RMSa

Monrobot Corporation, Morris Plains, N. J. *C, *A
Monrobot automatic electronic digital computers. Subsidiary of Monroe Calculating Machine Co. Ss(32) Se(1952) Dc RMSa

Monroe Calculating Machine Co., Orange, N. J., and elsewhere. *C
Desk calculating machinery for adding, calculating, and bookkeeping. SEE Monrobot Corporation. Ls(4000) Me(1925) Dc RMSa

Raytheon Manufacturing Co., Waltham, Mass. *C, *A
Radar, fire-control, microwave equipment. Big fast electronic digital computers (Raydac), one delivered. Tape handling mechanisms, magnetic heads, magnetic cores, shift registers. Ls(20,000) Me(1924) DAc RMSa

Ultrasonic Corp., 61 Rogers St., Cambridge 42, Mass. *C
Automatic control using feedback: development, equipment. Computing controls for machine tools. Ms(450) Se(1945) DACc RMSa

ROSTER OF ORGANIZATIONS MAKING COMPONENTS

(Information as of Sept. 10, 1953)

The purpose of this roster is to report organizations making components (but not making complete systems) that enter into computing machinery or data-handling equipment or equipment for automatic control and materials handling. Since this would be a very large list if we included all organizations making motors, resistors, magnetic cores, condensers, etc., this roster is not a free listing. For the conditions of listing, see page 33 ; also, the listing is subject to editing for completeness and objectivity; for the abbreviations, see the "Roster of Organizations in the Field of Automatic Computers and Automation".

ROSTER

Alden Electronic and Impulse Recording Equipment Co., Alden Research Center, Westboro, Mass. *A
  Facsimile recording equipment and facsimile components. Ma SEE Alden Products Co.

Alden Products Co., 117 No. Main St., Brockton, Mass. *A
  General and specific components for digital and analog computing machinery; plug-in components, sensing and indicating components, magnetic delay line units, magnetic storage cores, etc. Ms(300) Me(1930) Ic RMSa

Alfax Paper and Engineering Co., Alden Research Center, Westboro, Mass. *A
  Electrosensitive recording papers. Ma SEE Alden Products Co.

Andersen Laboratories, Inc., 39-C Talcott Road, West Hartford 10, Conn. *C, *A
  Solid ultrasonic delay lines. Ss(30) Se(1950) Ic RMSa

Ferroxcube Corp. of America, East Bridge St., Saugerties, N. Y. *A
  Magnetic cores (ferrites) for magnetic storage, magnetic recording heads, etc. Ms(100) Se Ic RMSa

General Ceramics and Steatite Corp., Keasbey, N. J. *C, *A
  Magnetic cores for computer components; technical ceramics, insulators, etc. Ls(650) Le(1906) Ic RMSa

Sprague Electric International, Ltd., North Adams, Mass. *A
  Capacitors, miniature and other. Ls Ic RMSa

Sylvania Electric Products, Inc., 70 Forsyth St., Boston 15, Mass. *C, *A
  Big fast electronic analog and digital computers for government. Subassemblies of diodes and triodes. Crystal diodes for computers. Ls(1200) Se (company, 1901; this division, 1945) DAc RMSa

AUTOMATIC COMPUTERS — LIST

(Edition 3, cumulative, information as of Sept. 3, 1953)

The purpose of this list is to report automatic computers in existence (all that are known to us). Each entry gives: name of computer (and interpretation of letters) / name of maker, place / purpose of computer, nature of computer, approximate size or capacity of computer, and quantity of computer in existence. Some words like "Model" and "Type" have been omitted from names of computers; usually the initial letters of the company name have been substituted.

Abbreviations: The key to the special abbreviations follows:

Purpose (p)
- Gp General purpose
- Sp Special purpose

Size (s)
- Ss Small size or low capacity
- Ms Medium size or medium capacity
- Ls Large size or large capacity

Nature of Computer (c)
- Dc Digital computer
- Ac Analog computer
- Ec Electronic computer
- Rc Relay computer
- Mc Mechanical computer

Quantity (q)
- Oq Zero (i.e., unfinished or dismantled)
- 1q One
- 2q Two
- Sq Small quantity, about 2 to 6
- Mq Medium quantity, about 7 to 30
- Lq Large quantity, over 30
- ?q Unknown quantity

Some other abbreviations have been used which can be easily guessed, like those in a telephone book.

We plan to keep this list up to date from time to time, and we shall be very grateful for any information which any reader is able to send us.

The total number of automatic computer types reported in this list is 107. The actual number of such types is probably somewhat larger.

ABC (Automatic Binary Computer) / Air Force Cambridge Res Cr, Cambridge / Gp EDc Ms 1q

Ace (Automatic Computing Engine) / National Physical Lab, Teddington, England / Gp EDc Ms 1q

Anacom (Analog Computer) / Westinghouse Electric Co, Pittsburgh / Gp EAc Ls 1q

ANSER (Analog Simulator and Computer) 300-A / Davies Laboratories, Inc, Riverdale, Md / Sp EAc ?s ?q

APEXC (All Purpose X-ray Computer) / Birkbeck College, Univ of London, London, England / Gp EDc Ms ?q

Arc (Automatic Relay Computer) / Birkbeck College, Univ of London, London, England / Gp RDc Ms 1q

Avidac (Argonne Version Institute's Digital Automatic Computer) / Argonne Natl Lab, Chi / Gp EDc Ls 1q

Barber-Colman-Stibitz Computer / Barber-Colman Co, Rockford, Ill / Gp EDc Ss 1q
Bark (Binary Automatic Relay "K"omputer) / Swedish Board for Computing Machines, Drottninggatan 95A, Stockholm, Sweden / Gp RDc Ls 1q
Beac (Boeing Electronic Analog Computer) / Boeing Airplane Co, Seattle / Gp EAc Ms Mq
Bell Model V / Bell Telephone Labs, New York / Gp RDc Ls 2q
Bell Model VI / Bell Telephone Labs, Murray Hill, N J / Gp RDc Ms 1q
Besk (Binär Elektronisk Sekvens-Kalkylator) / Swedish Board for Computing Machines, Drottninggatan 95A, Stockholm, Sweden / Gp EDc Ls 1q
Binac (Binary Automatic Computer) / Eckert-Mauchly Div, Remington-Rand, Phila, Pa / Gp EDc Ss 1q
Burroughs Laboratory Computer / Burroughs Adding Machine Co, Phila, Pa / Sp EDc Ls 1-2q
Cadac — SEE CRC
Caldic (California Digital Computer) / Univ of Calif, Berkeley, Calif / Gp EDc Ms 1q
CEC 30-201 / Consolidated Engrg Co, Pasadena, Calif / Gp EDc Ss Sq
Circle Computer / Hogan Labs, New York, & Nuclear Development Assoc, White Plains, N Y / Gp EDc Ss Sq
Computer / Electronics Div, AERE, Harwell, England / EDc
Computer / Haller, Raymond, and Brown, State College, Pa / Sp EDc Ss 1q
Computer / Imperial College, Univ of London, London / Gp RDc ?s 1q
Computer / Mathematisch Centrum, Amsterdam, Netherlands / Gp RDc Ls 1q
Computer / Naval Special Devices Center, Pt Washington, N Y / Dc
Computyper / Friden Calculating Machine Co, San Leandro, Calif / Gp MDc Ss ?q
CRC 101, 102, 102-A, 105, 107 / Computer Research Corp, Hawthorne, Calif / GSp EDAc SMLs Sq
CSIRO Mark I / Radiophysics Div, Commonwealth Sci and Indus Res Org, Sydney, Australia / Gp RDc Ms 1q
Davis Computer / USAF Inst of Tech, Wright-Patterson Air Force Base, Dayton, Ohio / Sp EAc Ms 1q
Differential Analyzer / General Electric Co, Schenectady / Gp MAc Ls 1q
Differential Analyzer No. 1, No. 2 / MIT Electrical Engrg Dept, Cambridge / Gp MAc, EAc Ls 1q
Differential Analyzer / Moore School of Electrical Engrg, Univ of Pa, Phila / Gp MAc Ls 1q
Dyseac ("di-" -second - Standards Eastern Automatic Computer) / National Bureau of Standards, Washington / Gp EDc Ls 1q
Edsac / Univ Mathematical Lab, Cambridge, England / Gp EDc Ls 1q
Edvac (Electronic discrete variable automatic computer) / Moore School of Electrical Engrg, Univ of Pa, Phila / Gp EDc Ls 1q
Elecom 100 / Electronic Computer Corp, L I City, N Y / Gp EDc Ss Sq
Elecom 120 / Electronic Computer Corp, L I City, N Y / Gp EDc Ss Sq
Elecom 200 / Electronic Computer Corp, L I City, N Y / Gp EDc Ls 1q
Elliott-NRDC Computer 401 Mk 1 / Elliott Brothers Res Labs, Borehamwood, Herts, England / Gp EDc Ls 1q
Eniac (Electronic numerical integrator and calculator) / Moore School of Electrical Engrg, Univ of Pa, Phila, Pa, and Ballistics Res Lab, Aberdeen, Md / Gp EDc Ls 1q
ERA 1101, 1102, 1103 / Engineering Res Assoc Div, St Paul / Gp EDc Ls Sq
Ferranti / Ferranti Electric Co, Moston, Manchester, England / Gp EDC Ls Sq
Flac (Florida Automatic Computer) / Air Force Missile Test Cr, Patrick AFB, Fla / Gp EDc Ls 1q
GEDA (Goodyear Electronic Differential Analyzer) L2, L3, N3 (linear and non-linear models) / Goodyear Aircraft Corp, Akron, Ohio / Gp EAc ?s ?q

Harvard Mark II, III, IV / Harvard Comp Lab, Cambridge, Mass / Gp RDc, EDc Ls lq
Hughes Airborne Control Computer / Hughes Res & Dev Labs, Culver City, Calif / GSp EDc Ms ?q
IBM Automatic Sequence Controlled Calculator, or Harvard Mark I / International Business Machines Corp, Endicott, N Y, and Harvard Univ, Cambridge / Gp RDc Ls lq
IBM Card Programmed Calculator / International Business Machines Corp, New York, NY/ Gp MEDc Ms Lq
IBM SSEC (Selective Sequence Electronic Calculator) / International Business Machines Corp, New York, N Y / Gp EDc Ls Oq (dismantled)
IBM 604 (Electronic Calculating Punch) / International Business Machines Corp, New York / Gp EDc Ss Lq
IBM 650 (IBM Magnetic Drum Calculator) / International Business Machines Corp, New York / Gp EDc Ms Sq
IBM 701 (Electronic Data Processing Machine) / International Business Machines Corp, New York / Gp EDc Ls Mq
IDA Electronic Slide Rule / Computer Corp of America, N Y / Gp EAc ?s ?q
Illiac (Univ of Illinois Automatic Computer) / Univ of Illinois, Urbana, Ill / Gp EDc Ls lq
Institute for Advanced Study Computer / Inst for Advanced Study, Princeton, N J / Gp EDc Ls lq
Jaincomp A, B, Bl / Jacobs Instrument Co, Bethesda, Md / Sp EDc Ss Sq
Kalin-Burkhart Logical Truth Calculator / T A Kalin & W Burkhart, Cambridge, Mass / Sp Rc Ss Oq
Logistics Computer / Engineering Res Assoc Div, Remington-Rand, St Paul / Sp EDc Ls lq
Los Alamos Computer / Los Alamos Lab, New Mexico / Gp EDc Ls lq
Maddida (Magnetic Drum Digital Differential Analyzer) / Bendix Computer Div, Los Angeles, Calif / Gp EDAc Ms Sq
Manchester Computer / Univ of Manchester, England / Gp EDc Ls lq
Maniac -- SEE Institute for Advanced Study Computer
Midac (Michigan Digital Automatic Computer) / Willow Run Res Cr, Univ of Michigan, Ypsilanti, Mich / Gp EDc Ls lq
Miniac / Marchant Research Inc, Oakland, Calif / Gp EDc Ss Oq
Monrobot / Monroe Calculating Machine Co, Orange, N J / Gp EDc Ss Sq
MSAC (Moore School Automatic Computer) / Moore School of Electrical Engrg, Univ of Pa, Phila, Pa / Gp EDc Ls Oq
Narec (Naval Research Laboratory Computer) / Naval Res Lab, Washington / Gp EDc Ls lq
Network Analyzer -- AC / General Electric Co, Schenectady / Gp EAc Ls lq
Network Analyzer — AC / Westinghouse Electric Co, Pittsburgh / Gp EAc Ls lq
Network Analyzer -- DC / General Electric Co, Schenectady / Gp EAc Ls lq
Network Analyzer -- DC / Westinghouse Electric Co, Pittsburgh / Gp EAc Ls lq
Nicholas (Nickel Delay-Line Storage Computer) / Elliott Brothers Res Labs, Borehamwood, Herts, England / Gp EDc Ss lq
Oarac / General Electric Co, Syracuse, N Y / Gp EDc Ms lq
ONR Relay Computer (Office of Naval Research) / Logistics Res Project, George Washington Univ, Washington / Gp RDc Ms lq
Oracle (Oak Ridge Automatic Computer & Logical Engine) / Argonne Natl Lab, Chicago/ Gp EDc Ls lq
Ordvac / Univ of Illinois, Urbana, Ill / Gp EDc Ls lq
Philbrick Computer / G A Philbrick Res, Inc, Boston / Gp EAc Ms Lq
Rand Computer / Rand Corp, Santa Monica, Calif / Gp EDc Ls lq
Raydac (Raytheon Digital Computer) / Raytheon Mfg Co, Waltham, Mass / Gp EDc Ls lq
Reac / Reeves Instrument Co, New York / Gp EAc Ls Lq

Remington-Rand 409 Computer / Remington Rand, New York / Gp EDc Ss ?q
R-PAC (Recorder Playback Automatic Computer) / Penn State College, State College, Pa/ Sp EAc Ss 1q
Seac (Standards Eastern Automatic Computer) / National Bureau of Standards, Washington / Gp EDc Ls 2q
Sec (Simple Electronic Computer) / Birkbeck College, Univ of London, London, England/ Sp EDc Ss ?q
S-FAC (Structure Factor Analog Computer) / Penn State College, State College, Pa / Sp EAc Ss 1q
Simon / Edmund C Berkeley and Assoc, New York, and others / Sp RDc Ss 3q
Spec (Special Purpose Electronic Computer) or USAF-Fairchild Computer / NEPA Project, Fairchild Engine and Airplane Co, Oak Ridge, Tenn / Sp EDc Ms 1q
Statac (Statistical Automatic Computer) / National Bureau of Standards, Washington, D C / Sp Dc ?s 1q
Swac (Standards Western Automatic Computer) / National Bureau of Standards, Los Angeles, Calif / Gp EDc Ls 1q
TC-1 / International Telemeter Corp, Los Angeles, Calif / Gp EDc Ls Oq
Univac / Eckert-Mauchly Div, Remington Rand, Inc, Phila, Pa / Gp EDc Ls Mq
Utec (Univ of Toronto Electronic Computer) / McLellan Lab, Univ of Toronto, Toronto, Canada / Sp EDc Ss 1q
Whirlwind I / Digital Computer Lab, Mass Inst of Tech, Cambridge 39, Mass / Sp EDc Ls 1q
X-RAC (x-ray analog computer) / Penn State College, State College, Pa / Sp EAc Ms 1q
Zuse Model IV / Konrad Zuse, Neukirchen, Germany, and Swiss Federal Inst of Tech, Zurich, Switzerland / Gp RDc Ls 1q

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Additions as we go to press:

Aeracom (Bureau of Aeronautics Analog Computer) / Aerial Measurements Laboratory, Northwestern University, Evanston, Ill / Gp EAc Ls 1q
Computer / Dynamic Analysis and Control Laboratory, Mass Inst of Technology, Cambridge 39, Mass / Gp EAc Ls 1q
EASE (Electronic Analog Simulating Equipment) / Berkeley Division, Beckman Instrument Co, Richmond, Calif / Gp EAc ?s ?q
Alwac / Logistics Research Inc, Redondo Beach, Calif / Gp EDc Ms ?q

THE MEETING OF THE ASSOCIATION FOR COMPUTING MACHINERY
IN CAMBRIDGE, MASS., SEPTEMBER 1953

by Edmund C. Berkeley

One of the best organized and fullest of the meetings of the Association for Computing Machinery took place at Mass. Inst. of Technology, Cambridge, Mass., September 9, 10, and 11. Over 400 persons registered for the meeting.

The abstracts of 70 papers appeared in the program, and almost all of these papers were delivered. The areas of the papers are largely indicated by the titles of the technical sessions, which were as follows: Sept. 10: Punched Card Techniques, Numerical Analysis, Digital Computer Techniques, Recent Systems Developments. Sept. 11: Digital Computer Programming, Punched Card Mathematics, Logical Algorithms. Sept. 12: Numerical Solution of Partial Differential Equations, Analog Computation, Operation of a Computation Center, Business Data Handling.

The President of the Association, Mr. S. B. Williams, announced that the Association would publish a regular quarterly journal, starting in January, 1954. Many (if not all) of the papers given at the meeting will be published in the journal, though naturally not all of them in the first issue. In addition, anyone may submit papers to the editor to be considered for publication; the editor is Franz L. Alt, National Bureau of Standards, Washington 25, D. C.

The quarterly journal will be sent to all members of the Association, for whom dues are raised from $2 a year to $6 a year, effective Jan. 1, 1954. If any reader of "Computers and Automation" is interested in becoming a member of the Association and thus receiving the journal, he should send a letter applying for membership and enclosing dues to the Secretary of the Association, Mr. E. Bromberg, Institute of Mathematical Sciences, New York University, 25 Waverly Place, New York 3, N. Y.

It is planned that the Digital Computer Newsletter, until now published only by the Office of Naval Research, will be reprinted in the journal of the Association. ONR is restricting the Newsletter mailing list to only persons employed in government or associated with government contractors.

The session on Business Data Handling was of course particularly interesting to the least vocal section of persons interested in computing machinery: men in business and industry. Following are the titles, authors, and abstracts of this session:

Premium Billing Performed by Large-Scale Computers / R T Wiseman, Sun Life Assurance Company of Canada, Montreal, Canada / An outline will be given of the technical method to be used by the Sun Life Assurance Company. The effect of the installation of electronic computers upon the clerical operations, routines, organization, and operating personnel will be described.

Periodic Billing and Accounting / E F Cooley, Prudential Insurance Company of America, Newark, N J / Periodic billing by its scheduled nature and absence of random occurrence is an excellent possibility for the application of electronic comput-

ing machinery. The process is often complex and includes many exceptional cases, but prior knowledge allows handling this. At present, these exceptions spoil many machine procedures by their frequency and minuteness. Electronics may overcome the necessity of their removal and separate handling. Accounting for payments resulting from periodic billing is random. However, one attribute makes it a possibility for computing machinery. The payment usually equals the whole amount billed and reduces the outstanding balance to zero. The study of job attributes such as these is the correct approach to electronics. A study of periodic billing and accounting indicates that their attributes are compatible with the new machines.

The Development and Application of Electronic Equipment in Monsanto's Accounting Department / E J Cunningham, Monsanto Chemical Company, St Louis, Missouri / A little over four years ago Monsanto Chemical Company decided to explore the practicable application of electronics in accounting. The ultimate goal was the complete electronization of the company's accounting system. A brief description of how Monsanto researched, planned and applied electronics in accounting. The practical results so far obtained. An evaluation of electronic equipment and its future role in accounting work.

Experience with the Census Univac / D H Heiser and J L McPherson, Bureau of the Census / Almost thirty months of use of a Univac System on problems characterized by very large input volume has developed admiration and respect for many of the characteristics of this system and irritation and impatience with other characteristics. The internal computation ability and reliability is high, well-known, and can be depended upon. The self-checking features work almost perfectly but some automatic facilities for resuming operation after a check stop would be an extremely worthwhile addition. The input and output equipment causes the most difficulty. Since it is an integral part of the system as a whole, it is felt that suggested improvements might double the efficiency of the Univac System.

Budget Computation on IBM-701 / Lt R E Utman, Navy Aviation Supply Office, Philadelphia, Pa / The Navy Aviation Supply Office has recently sponsored computation of the fiscal budget requirments of the Naval Aviation Supply System on the IBM-701 computer. Previous ASO budget compilation has been performed on the IBM-CPC and conventional equipment as well as completely by manual and desk calculator extension. Comparison of pertinent characteristics of the three approaches substantiates the major role electronic computers can be expected to assume in future business applications within the Navy.

FORUM

1. More Discussion on The "Thinking" Computer. From Fred Shunaman, Managing Editor, "Radio-Electronics", New York:

Thanks for the clippings on talking about computers. Reading the "backtalk", I cannot help thinking that while some of the answers are reasonably well thought out, there seems to be a tendency to overlook the fact that many of the people who work with computers have apparently been up against a real fear of the thinking computer. This appears to be expressed by people who are afraid of being displaced by thinking machinery.

Generally speaking, computer men at first deny emphatically that the machine can think, but if tactfully questioned will point out that such processes as feeding them white (random) noise when the machine reaches an impasse, and thereby letting them choose one path of reasoning after another until they arrive at one which will effect a solution, does possibly parallel what in the human being would be known as thinking out a problem.

I was slightly disappointed to see that this point had not been brought out in the answers, but possibly many of the computer men consciously steer clear of it. Apparently they don't want to arouse any more prejudice against the instruments than is necessary. To me, however, it is a very interesting phenomenon--the fact that men seem to be afraid of equipment they themselves are making.

If anything along the same subject comes up later, I would certainly appreciate seeing it.

Any more discussion?

* * *

2. Excerpt from "Newsweek" of Sept. 7, 1953:

RUSSIAN BRAINS ... Western scientists who have glimpsed Russian progress in applied mathematics and physics have inferred that Soviet scientists must be expert in building giant computing machinery. Some of their achievements would hardly have been possible without the aid of tireless, rapid-fire electronic calculators.

This week Computers and Automation, an authoritative American journal devoted to mechanical brains and their applications, is publishing a survey of Russian accomplishments in that field. The author of the article is a mysterious but apparently well-informed Italian, Dr. Tommaso Fortuna of Milan.

The Russian Academy of Sciences handles computer development through a committee of leading mathematicians and physicists, Fortuna reveals. So active is this group that the Soviet Union spends more money on developing mechanical brains that on any other form of technical research. One reason for this emphasis may be a recent admission by the committee that the United States has the lead in computer design.

Despite the fact that the Russian Government obviously endorses this work, it is probably severely handicapped by the same sort of belligerent nationalism that has

made a ridiculous hodgepodge of Soviet genetics, as well as other arts and sciences. Fortuna recalls that expert computer-research teams in Prague and Budapest were doing outstanding work before Czechoslovakia and Hungary became Russian satellites. "Very discouraging information continues to be heard from these men since the change," he notes cryptically.

The secrecy that separates Russian scientists from the rest of the world also may be costly. "Comments and criticisms from the world scientific body on their more detailed technical articles ... would, as nothing else can, separate the wheat from the chaff and would save them time and expense on already tested futile paths."

Footnote for "Newsweek" staff: Mr. Fortuna, not Dr. Fortuna.

* * *

3. Small Beginnings. From Walter Axelsen, Advertising Manager, Automatic Electric Co., Chicago, Ill.:

We were greatly interested in the issue of COMPUTERS AND AUTOMATION which you recently sent at our request. I am reminded of the small beginnings of publications such as "Instruments" and "Electronics" which, twenty years ago, began in their respective fields the kind of job you are doing in yours. Be assured I wish you similar success!

We shall be watching your progress with interest, and as soon as we have a product that seems particularly applicable to your publication, you will be hearing from us!

A recent issue of "Electronics" was 436 pages long, contained about 19 articles, and some 350 advertisements. In another twenty years, will it be 900 pages long and contain 700 ads? Or will we have automatic computers to do our reading and understanding for us?

We are grateful for Mr. Axelsen's good wishes. But we wonder what is the optimum size for a monthly magazine.

* * *

WHO'S WHO IN COMPUTERS AND AUTOMATION: SECTION 3

-- NOT BUSINESS, NOT PROGRAMMING -- S TO Z

(First edition, cumulative, information as of Sept. 3, 1953)

This is a seventh and last installment of a Who's Who of individuals in the field of computers and automation. The purpose of this Who's Who is to make it easier for all persons interested in this field to get in touch with each other in appropriate ways.

Contents. The following list consists of persons interested in computing machinery who have not reported as a main interest either "programming" or "business", for whom information has been received up to Sept. 3, 1953, and whose last name begins S to Z.

Reporting. If you are interested in any phase of computing machinery, robots, cybernetics, or automation, and if you would like to be included in the Who's Who, please send us: your name (please print), address, organization (and its address), your title, main interests (note list appearing under "Abbreviations" below, and specify any other interests), year of birth, your college or last school, years of experience in the field, your occupation, and any more information about yourself that you may care to furnish. (A blank for your Who's Who entry appears on another page in this issue). Your listing in the Who's Who does not depend in any way on your subscription to COMPUTERS AND AUTOMATION although of course your subscription will be welcome.

Entry. Each entry in the Who's Who when it becomes complete contains: name / title, organization, address / interests / year of birth, college or last school (background), years in field, occupation. The address has been substantially contracted to avoid the nuisance of unwanted mail. In cases where no information has been given (for example, about occupation) a "-" denotes omission.

Abbreviations. Since a great deal of information is to be presented, abbreviations have been extensively used. Nearly all these abbreviations can be easily guessed, like those in a telephone book. The letters A,B,C,D,E,M,P,S stand for main interests "Applications, Business, Construction, Design, Electronics, Mathematics, Programming, Sales", respectively, as provided for in the Who's Who entry blank.

Liability. Although we have tried to make each entry complete and accurate, we assume no liability for any statements expressed or implied.

Corrections. We shall be very grateful for any information, additions, or corrections that any reader is able to send us.

S: Sagen, Oswald K / chf statn, Illinois Dept Pub Health, Springfield, Ill / IBM equipment / '06, U Chic (PhD'34), 12, statn

Saile, Charles J / des engr, Raymond Rosen Eng Prod, Phila, Pa / DE / '29, Drexel Inst Tech, -, des engr

Sarkissian, Hrant H / chf engr, Computer Res Corp, Hawthorne, Cal / DE, dev / '22, U Cal, 5, engr

Satterthwaite, William F / self-emp, Phila, Pa / DES / '04, Moore Sch EE, U Pa, -, mfrs rep

Savidge, David V / sales mgr, Univac Sys, Rem Rand, N Y / AS / '08, NYU, 3, salesman

Scarborough, J B / prof emer math, U S Naval Acad, Annapolis, Md / AM / '85, Johns Hopkins U, 6, writer & student

Scharff, Samuel A / 1st Lieut, Rome Air Dev Center, ARDC, Griffis AFB, Rome, N Y / ACDE, sys engrg / '21, MIT, Grad Sch, 8, -

Scharmann, Richard F / sec engr, U S Naval Air Dev Center, Hatboro, Pa / DE, airborne comp / -, U Pa Grad Sch, 3, engr

Scherberg, Max G / chf appld math, Wright Aero Dev Center, USAF, Ohio / M, analog meth / '02, U Minn, 3, consltnt engr & mathn

Schmidt, William H / assoc acty, Selection Dept, Mutual Life Ins Co of N Y, N Y / -/ '15, -, 2, underwriter

Schneider, Robert / engr, Autopilot Lab, Bendix Aviation Corp, Teterboro, N J / ADE, feedback contr / '27, MIT, 4, engr

Schroeder, Hans / -, -, Milwaukee, Wisc / DEM / '29, Milwaukee Sch Engrg, 0, student

Schuler, R G / res dir, Victor Adding Mach Co, Chic, Ill / DE / -, Armour Inst Tech, 20, res dir

Schumann, Robert W / sr elec engr, Engrg Res Assoc, St Paul, Minn / DE / '20, U Wis, 1, engr

Schwertz, F A / sr fellow, Mellon Inst, Pgh, Pa / CD, dig comp compnts / '13, Carnegie Inst Tech, 3, physicist

Scola, Peter J / cust engr, IBM, Montclair, N J / CDE / '22, Newark Coll Engrg, 2, engr

Scott, William F / res assoc, WRRC, Ypsilanti, Mich / DEM / '27, -, 2, engr

Seaman, Miss A E / librn, Leeds & Northrup Co, Phila, Pa / EM / -, -, -, librn

Seebald, Henry A / meth engr, Rem Rand, N Y / AMS, meth & sys / '20, Lehigh U (MA'49), 2, engr

Selig, Alfred / asst statn, United Medical Serv, N Y / A, file maint / '09, CCNY, -, statn

Selip, John / -, -, Weirton, W Va / EM / '14, Coll Steubenville, 0, tv serv engr

Sharp, Elmer M / aero res sci, NACA, Berea, Ohio / ACDE, auto data recdg / '23, Cornell U, 4, -

Sherman, Herbert / stf mbr, Lincoln Labs, MIT, Camb, Mass / - / -, -, -, -

Sherman, Jack / mathn, Texas Co, Beacon, N Y / AM / -, Cal Inst Tech, 6, mathn

Sherman, Samuel M / supt, Contr Eqpt Div, U S Naval Air Dev Center, Johnsville, Pa / ADE, military aplns / '14, U Pa (AB, MA), 5, elecnc physicist

Sherman, Seymour / stf mbr, Bell Telephone Labs, Whippany, N J / ADEM / '24, Harv U, 4, engr

Siegel, Keeve M / hd, Theory & Analysis Dept, WRRC, Ypsilanti, Mich / AEM / '23, Rensselaer Polytech Inst, 5, res physicist

Silberman, Nathaniel M / -, -, Chic, Ill / CDE / -, U Chic, Ill Inst Tech, 0, student

Simmen, Robert L / microwave engr, Motorola, Inc, Chic, Ill / AS, instln microwave commn, industl contr & tv relay sys / '27, U Ill (BS'52EE), -, engr

Simms, Preston W / sales mgr, Telecomputing Corp, Burbank, Cal / S / '15, U Wisc, 2,-

Simons, John C, Jr / proj engr, Servomech Lab, MIT, Camb, Mass / AD, auto contr sys / '20, MIT(PhD Physics), 1, engrg physicist

Sims, John C, Jr / proj engr, Eckert-Mauchly Div, Phila, Pa / CD / '17, Virginia Military Inst, 7, engr

Singer, G H, Jr / tech rep, Boeing Airplane Co, Seattle, Wash / AMS / '21, Purdue U, Nwn U (EE), 6, sales engr

Sisson, Roger Lee / elecnc engr, Computer Res Corp, Hawthorne, Cal / AD, comp design, serv & maint / '26, MIT, 5, engr

Slover, William L / -, Monroe Calc Mach Co, Orange, N J / E, patents / '21, Pratt Inst, 7, patent agt

Smart, J E / asst secy, Confederation Life Assoc, Toronto, Canada / '04, U Toronto, 0, life ins admr

Smith, Albert E / suprvr res contracts, ONR, Navy Dept, Wash, D C / AEM / '07, U Ill, 6, elecnc sci

Smith, Bernard A / res assoc, WRRC, Ypsilanti, Mich / ACDEM / '26, U Ill, 2, physicist

Smith, Charles V L / hd, Comp Branch, Ofc Naval Res, Arlington, Va / ACDEM / '09, Harv Grad Sch (PhD'39), 6, -

Smith, Gerald E / IBM tab eqpt suprvr, U S Govt, Arlington, Va / EM / '31, -, 3, -

Smith, Graham E / sr elec engr, Engrg Res Assoc, St Paul, Minn / S, instrcn book writing / '20, Pa State Coll, U Minn, 4, sales engr-tech writer

Smith, J Ernest / asst vp & dir engrg, Raytheon Mfg Co, Waltham, Mass / DE / -, Cal Inst Tech, 5, -

Smith, Perry C / sr engr, Federal Telephone & Radio Corp, Clifton, N J / ADEM, dev & apln / '26, Pa State Coll, 0, engr

Smith, Ramon W / elecnc sci, Natl Bur Std, Wash, D C / CDE / '23, U Md, 2, elec engr

Smith, Raymond Geo / 1Lt, USAF, Weather Serv, Lackland AFB, Tex / AE, weather res & forecasting / '23, St Louis U('52), 0, student weather officer

Smith, V G / prof elec engrg, Univ Toronto, Can / ADE / '01, U Toronto, 4, prof

Smoliar, Gerald / sr prof engr, Electronic Comp Div, Underwood Corp, L I City / DE / '17, Moore Sch, U Pa, 6, engr

Snider, Charles C / regional mgr, CEC Instruments, Inc, Wash, D C / ES / '24, Nwn U, 3, -

Sobczyk, Andrew / stf mbr, Los Alamos Sci Lab, N Mex / M / '15, U Minn (BA, MA), Princeton (PhD'39), 2, prof math

Speert, Julius L / geodetic engr, Topographic Div, U S Geol Survey, Wash, D C / A / '06, MIT, -, geodetic res

Spence, Homer W / elecnc sci, Comp Lab, BRL, Aberdeen Prvg Grnd, Md / DE / '16, Mich State Coll, 7, engr

Spencer, Gordon R / sr engr, Philco Corp, Pa / DE, cath ray tubes / '25, Cornell U, 2, elec engr

Spencer, Richard W / engr, Eckert-Mauchly Div, Phila, Pa / DE / '27, MIT, 3, elec engr

Spohn, Robert H / mathn, Vitro Corp Amer, Verona, N J / AM / '14, Lehigh U, 1, mathn

Sprague, Richard E / dir apln & mbr bd dir, Computer Res Corp, Hawthorne, Calif / AD/ -, U Cal, Purdue U (BSEE'42), 7, -

Stark, Richard H / hd, Mach Calcn Unit, Knolls Atomic Power Lab, Schenectady, N Y / M / '16, -, 5, -

Stein, Mordecai / elecnc engr, Comp Lab, Natl Bur Std, Wash, D C / ADE / '27, George Wash U (BEE), U Md Grad Sch, 3, elecnc engr

Steinback, Ralph T / jr fellow, Mellon Inst, Pgh, Pa / DE / '23, U Pgh, 4, -

Steinhaus, H W / res asst to pres, Equitable Life, N Y, N Y / A / '08, Goettingen, Germany (PhD'31), 8, economist & acty

Sterne, Theodore E / chf, Comp Lab, Ballistic Res Labs, Aberdeen Prvg Grnd, Md / A / '07, Camb U, 20, mathl physicist

Stewart, W E / mgr, Audio Engrg, RCA Victor Div, Camden, N J / DE / '08, U Nebr, Iowa State Coll, 0, engr

Stibitz, George R / self-emp, Burlington, Vt / ADM / '04, Cornell U (PhD), 14, consltnt govt & industry

Stifler, William W, Jr / gen mgr, Ferroxcube Corp of Amer, Saugerties, N Y / DE, comp compnts / '16, Amherst (BA'39), 3, mgr

Stillwell, H S / prof & hd, Aero Engr Dept, Univ Ill, Urbana, Ill / AM / '17, U Minn, 5, aero engr
Stone, Joseph J, Jr / elec engr, Battelle Mem Inst, Columbus, O / ACDE / '23, Va Poly Inst (BS), Harvard (MS), 5, elec engr
Stone, Noel T / sr engr, Engrg Res Assoc, Minnpls, Minn / CD / '20, U Minn, 5, elec engr
Stowe, Lloyd W / sr prgmr, Eckert-Mauchly Div, Rem Rand, Phila, Pa / DS / '25, Ursinus Coll, 3 , prgmr
Striegel, Albert L, Jr / U S Army, - / CD / High Sch & Military Inst, O, -
Stuart-Williams, Raymond / res engr, RCA Lab Div, Princeton, N J / D, storage / '21, Glasgow U, 4, res on storage
Sublette, Ivan / elec engr, RCA Victor, Camden, N J / CDE / '29, U Pa, 2, engr
Sutro, Louis L / engr, Dig Comp Lab, MIT, Camb, Mass / ADE, display sys / '15, -, 2, engr
Sutton, Wilfred A / res asst, WRRC, U Mich, Ypsilanti, Mich / ACDEM / '27, U Mich, 2, res engr
Swartzel, Karl D / stf sci, Cornell Aero Lab, Buffalo, N Y / AE / '07, U Pgh, 12, engr-sci
Swedlund, L E / engr, RCA Victor Div, Lancaster, Pa / D, cath ray tube des / '05, Calif Inst Tech, 3, engr
Sweet, Robert A / hd, Apld Phys Sec, Armament Test Div, Naval Air Test Cr, Patuxent River, Md / AM, reduc expermntl data / -, Nwn U, 3, physicist
Swenson, T G / meth & proc supervr, Universal Atlas Cement, N Y / -, '12, NYU, -, -
Switzer, James D / chem, Switzer Companies, St Louis, Mo / DEM / '16, Georgetwn Univ, (BS'39), -, candy mfr

T: Tabor, Lewis P / assoc dir, Franklin Inst Labs, Phila, Pa / ACDE / '00, MIT, 6, suprvr res & dev
Tait, George R / dev engr, Phillips Petroleum Co, Bartlesville, Okla / AM, spec engrg prob / '26, U Arkansas, 1, engr
Tait, John B / elecnc desgr, IBM Corp, Vestal(?), N Y / DE / '25, MIT, 4, elecnc desgr
Taylor, Margaret O / -, Gulf Res & Dev Co, Pgh, Pa / AM / '17, U Pgh, O, -
Taylor, Marvin / dev engr, Monroe Calc Mach Co, Orange, N J / ADM, res & dev / '25, Cooper U, (BME'47), 3, engr
Taylor, W Bruce / instrctr, Dept Philosophy, UCLA, Los Angeles, Calif / D, cybernetics, logic / '21, UCLA(PhD), 1, tchr phil
Tholstrup, H / dev engr, Commercial Controls Corp, Rochester, N Y / CDE, res & dev / '01, U Minn (BS, MS), 18, engr
Thompson, Lyle G / assoc res engr, Burroughs Adding Mach Co Res Actvty, Primos, Pa / CD / '21, U Mich, 3, elecnc engr
Thompson, Russell Griffith / engr, Eastman Kodak Co, Rochester, N Y / D, hi-speed printing / '92, U Mo (BSEE'14), Princeton (EE'15), -, engr
Thorensen, R / chf, Mach Dev, Natl Bur Std, Los Angeles, Calif / ACDE / '21, Stanford U, 4, engr
Thornley, Robert B / engr, Brown Instr Div, Mnpls-Honeywell Regulator Co, Phila, Pa / ACDE / '15, U Mich, CCNY, 4, engr
Tilston, William V / mathn, Sinclair Radio Labs, Toronto, Can / ADEM / -, U Toronto, 2, engr res & dev
Titman, William / res lab analyst, Northrop Aircraft Co, Los Angeles, Calif / AD/'23, Moore Sch EE, U Pa, 3, dig comp engr
Toense, Raymond A, Jr / elecnc sci, Elecnc Comp Lab, Natl Bur Std, Wash, D C /DE/'23, U Md, 3, des comp eqpt
Tomash, Erwin / asst dir comp dev, Engrg Res Assoc, St Paul, Minn / ADS / -, U Md, 6, elec engr
Tompkins, Charles B / mathn, Natl Bur Std, Los Angeles, Calif / DM / '12, U Mich (PhD '35), Princeton Inst Adv Stdy ('36-38 Natl Res Fellow), 7, mathn-economtrst

Toops, Herbert A / prof psych, Ohio State Univ, Columbus, O / ADM / '95, Columbia U (PhD'21), 25, coll prof
Trantham, Henry, Jr / res engr, Instrmn Lab, MIT, Camb, Mass / ACDEM / '15, Baylor U, 7, engr
Travers, Paul / chf engr, Electromech Engrg Dept, Ultrasonic Corp, Camb, Mass/ADEM/ '21, MIT (SM'48, SB'44), 8, engr
Travis, Irven / vp res, Burroughs Adding Mach Co, Phila, Pa / ofce eqpt / '04, U Pa, 20, -
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Westerfield, E C / elecnc sci, Navy Elecncs Lab, San Diego, Calif / ADEM, res / '01, U Colo, 2, elecnc sci

Wexler, Harry / chf, Sci Serv Div, U S Weather Bur, Wash, D C / numerical weather prediction / '11, MIT, 0, meterologist

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Toops, Herbert A / prof psych, Ohio State Univ, Columbus, O / ADM / '95, Columbia U (PhD'21), 25, coll prof

Trantham, Henry, Jr / res engr, Instrmn Lab, MIT, Camb, Mass / ACDEM / '15, Baylor U, 7, engr

Travers, Paul / chf engr, Electromech Engrg Dept, Ultrasonic Corp, Camb, Mass/ADEM/ '21, MIT (SM'48, SB'44), 8, engr

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U: Urban, Bernard / mathn, Natl Bur Std, Wash, D C / M / '26, Amer U, 2, mathn

V: Van Dyke, Henry A / hd, Optical Mechl Div, NAMTC, Pt Mugu, Calif / A / '94, Rensselaer Polytech Inst, -, mechl engr

Verzuh, Frank M / dir statl serv, MIT, Camb, Mass / ADEM / -, MIT, 12, tchg & res

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Waller, Bennie F / elec engr, NAMTC, Pt Mugu, Calif / DEM / '24, U Calif, 4, elec sci

Walsh, J L / prof math, Harvard Univ, Camb, Mass / AM / '95, Harvard U, 3, mathn

Walters, Stanley S / operns analyst, Operns Res Ofc, Johns Hopkins Univ, Md /M/ '24, UCLA (PhD Math'50), 2, mathn

Wanlass, Cravens L / res engr, North Amer Aviation, Whittier, Calif / CDE / '25, U Calif, 3, engr

Wapner, Joseph S / -, Taller & Cooper, Inc, Bklyn, N Y / A / '14, NYU, 12, elecnc engr

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Warren, John E / hd, Elecncs & Measurements Sec, M W Kellogg Co, Jersey Cy, N Jersey/ ACDEM / '13, U Pa, Moore Sch EE, 8, physicist & constlnt

Wasow, Wolfgang R / mathn, Inst Num Anal, Natl Bur Std, Los Angeles, Calif / M, res / -, NYU, -, mathn

Watson, W H / hd dept, Univ Toronto, Canada / A, theoretical physics / '99, Camb U, Eng, -, prof physics

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Welburn, Henry / tech engr, IBM Corp, Endicott, N Y / DE, circuit des / '16, MIT (Radar Sch), 4, engr
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Westerfield, E C / elecnc sci, Navy Elecncs Lab, San Diego, Calif / ADEM, res / '01, U Colo, 2, elecnc sci
Wexler, Harry / chf, Sci Serv Div, U S Weather Bur, Wash, D C / numerical weather prediction / '11, MIT, 0, meterologist
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Wilks, Samuel S / prof math stats, Princeton Univ, Princeton, N J / M / '06, U Texas, U Iowa, 0, statn
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Wilson, W / experl stf, Elecnc Sec, Natl Physical Lab, Teddington, Eng / CE / '09, London U, Eng, 5, -
Winsor, Paul, III / assoc res engr, Burroughs Res Activity, Phila, Pa / ACDE, circuit & sys engrg / '25, MIT, 4, engr
Winter, Joseph A / self-emp, N Y / psychosomatic medicine, relationship of comp to human thinking / '11, U Marquette Med Sch, -, physician
Wissotzky, Basil / foreign patent atty, Bendix Aviation Corp, Paris, France / ADM, dig comp / '13, Ecole Centralé, Paris, 1, engr
Wolfson, William / engr, Comp Dept, Raytheon Mfg Co, Waltham, Mass / ACDE / '23, Harvard U, 5, elecnc engr
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Wooldridge, E J / prod mgr, Comp Div, Bendix Aviation Corp, Hawthorne, Calif / CE / '22, U So Calif, 5, -
Wright, J Howard / grp leader, Components Res, Elecnc Comp Lab, Natl Bur Std, Wash, D C / AE / '16, Penn State, U Nebr, 8, elecnc sci (physics)
Wright, M A / sci stf, Elecncs Sec, Natl Physical Lab, Teddington, Eng / ADE / '24, London U, Eng, 5, -
Wyke, Albert A / res & dev engr, Elecncs Div, American Mach & Foundry, Boston, Mass/ D / '24, Harvard U (Grad Sch Appl Sci), 2, engr
Wylen, Joseph / assoc res engr, Burroughs Adding Mach Co, Phila, Pa / D / '24, MIT, 3, engr
Wynne, James J / sr engr, Rem Rand, Phila, Pa / CDE, dev & test / '24, Villanova Coll, 2, engr

Y: Yamamoto, William S / -, -, Phila, Pa / AM / '24, AB(Chem) MD'49, 0, physician
Youtz, Patrick / grp leader, Dig Comp Lab, MIT, Camb, Mass / CDE / -, -, 12, res engr
Yuni, W / sr engr, Control Instrument Co, Bklyn, N Y / DE, fire control / '25, CCNY, 2, engr

Z: Zachmann, Peter / res asst, Univ Mich, Ann Arbor, Mich / E / -, CCNY, 1, -
Zagor, Herbert I / hd, Elecncs Sec, Republic Aircraft Corp, N Y / ACDEM / '16, NYU (PhD'43), U Pa '46, MIT'49, 6, physicist-elecncs
Zastrown, Roy L / res asst, WRRC, Univ Mich, Ypsilanti, Mich / CDE / '26, U Mich (MS BS Physics), -, physicist-elecncs solid-state
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Hungarian Prelude to Automation — Gene J. Hegedus

May: Compiling Routines — Grace M. Hopper, Remington Rand
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July: Machine Translation — Y. Bar-Hillel, Mass. Inst. of Technology
Robot Traffic Policemen — George A.W. Boehm, Science Editor, Newsweek
How to Talk About Computers — Rudolf Flesch, Author of "Art of Plain Talk"

September: The Soviet Union: Automatic Digital Computer Research — Tommaso Fortuna
Digital Computer Questionnaire — Lawrence Wainwright
"How to Talk About Computers": Discussion -- G.G. Hawley and others

REFERENCE INFORMATION: Roster of Organizations in the Field of Computers and Automation
Roster of Organizations Making Components • List of Automatic Computers
Who's Who • Books and Other Publications • Glossary • Patents

Price of back copies, $1.25 each — or a subscription (see rates on page i) may be specified to begin with any issue from October 1952 to date.

Edmund C. Berkeley and Associates, 36 West 11 St., New York 11, N.Y.

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( ) Applications
( ) Sales
( ) Electronics
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( ) Programming
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College or last school?..........
Years of experience in computing machinery field?..........
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Please send me additional information on the following subjects for which I have circled the CA number:

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11	12	13	14	15	36	37	38	39	40	61	62	63	64	65	86	87	88	89	90	111	112	113	114	115	136	137	138	139	140
16	17	18	19	20	41	42	43	44	45	66	67	68	69	70	91	92	93	94	95	116	117	118	119	120	141	142	143	144	145
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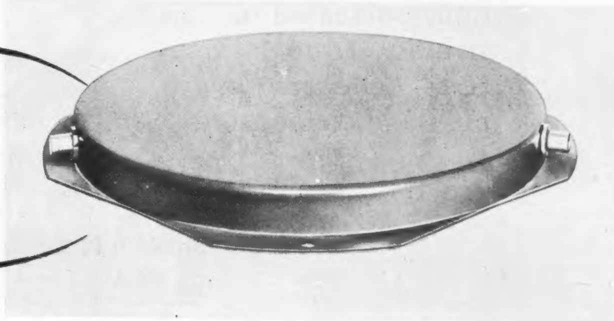

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Any organization making components that can be used in computing machinery or data-handling equipment or equipment for automatic control or materials handling may be listed in the "Roster of Organizations Making Components". The cost for the listing is $3 a line with a minimum of four lines; if a company making components advertises in the same issue, it will receive a four-line listing free. The listing will be subject to the customary editing for completeness and objectivity.

If you are interested in a listing for your organization, please supply the information for a Roster entry (see p.12) and write to Edmund C. Berkeley and Associates, 36 West 11 St., New York 11, N. Y.

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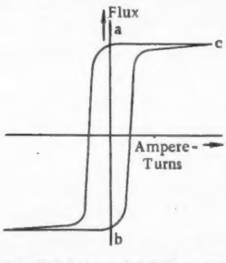

MATERIAL - a grain-oriented heat-treated alloy of nickel-iron with an extremely rectangular hysteresis loop, magnetically saturable in a given direction by application of a relatively weak magnetizing field. Once magnetized, removal of the magnetizing force leaves core in either state "a" or "b", depending on original direction of magnetization.

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in high volume at low cost - Get your lab working - Send for literature and order samples of either --

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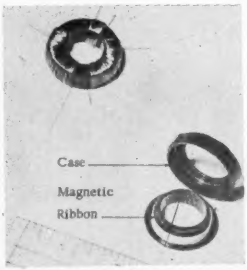
4 Alden Magnetic Storage Cores (#725BWA-1) containing 2-1/8 wraps of 1 mil grain-oriented, heat-treated, nickel-iron alloy, 1/8" wide - with 75, 150, and 200 turns of #36 wire. $5.00*



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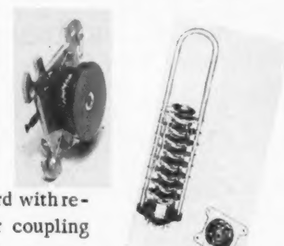
2 Alden Static Magnetic Memories (#5100RA) consisting of miniature toroidal core having 3 windings mounted on terminal card with resistor and rectifier coupling circuit. $10.00*



*Prices in accordance with our Standard Component Proposal of 10/15/49, limited to this offer only.

ALDEN PRODUCTS COMPANY NA-ALD 114 N. MAIN STREET, BROCKTON MASSACHUSETTS

From: Edmund C. Berkeley and Associates
Publishers of COMPUTERS AND AUTOMATION
36 West 11 St., New York 11, N. Y.

ADVERTISING

1. <u>What is "COMPUTERS AND AUTOMATION"?</u> It is a magazine published monthly, except June and August, containing articles and reference information related to computing machinery, robots, automatic controllers, cybernetics, automation, etc. One important piece of reference information published is the "Roster of Organizations in the Field of Computers and Automation". The basic subscription rate is $4.50 a year in the United States and Canada. Single copies are $1.25. The magazine was called THE COMPUTING MACHINERY FIELD until the March issue; prior to that issue, it was published less often than ten times a year.

2. <u>Who are the logical readers?</u> The logical readers of COMPUTERS AND AUTOMATION are some 3000 persons who are concerned with the field of computers and automation. Many people are entering this field all the time. These include a great number of people who will make recommendations to their organizations about purchasing computing machinery and similar machinery. We have been carefully gathering the names and addresses of these people for some time and believe we can reach them. The print order for the October issue is 1400 copies. The paid subscriptions on September 10, 1953 were a little over 970.

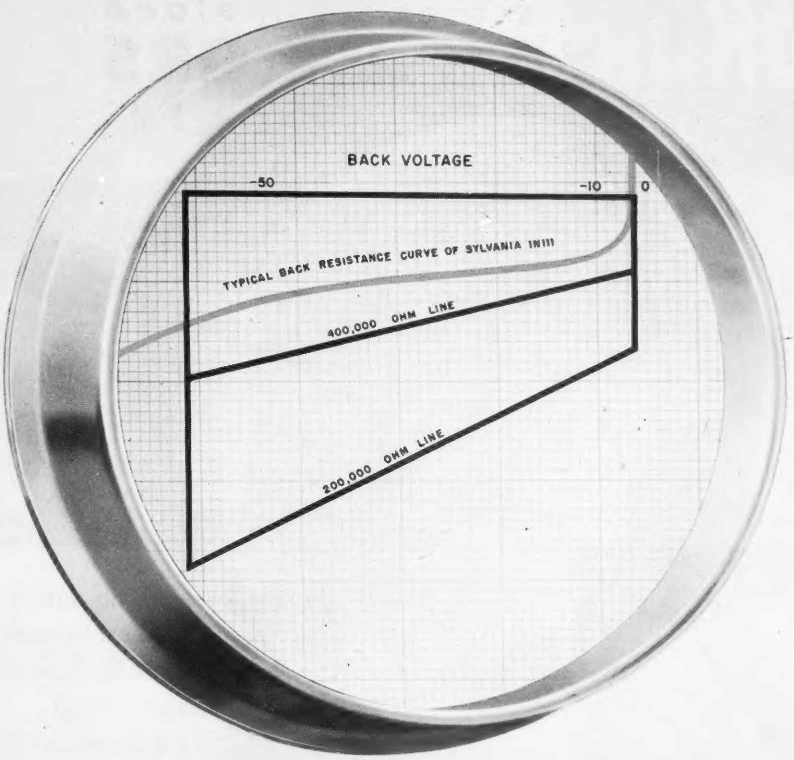
3. <u>What type of advertising does COMPUTERS AND AUTOMATION take?</u> The purpose of the magazine is to be factual and to the point. For this purpose the kind of advertising wanted is the kind that answers questions factually. We recommend for the audience that we reach, that advertising be factual, useful, interesting, understandable, and new from issue to issue. We have had a number of comments expressing satisfaction with our style of advertising.

4. <u>What are the specifications and cost of advertising?</u> The next two issues of COMPUTERS AND AUTOMATION will be in Nov. and Dec. 1953. They will be on pages 8½" by 11" and will be produced by photooffset. If possible, the company advertising should produce final copy, which should be actual size, and may include typing, writing, line drawings, printing, screened halftones, etc.—any copy that may be photooffset without further preparation. If inconvenient to produce this, we will take rough copy and arrange with the printer to prepare it; there will be small additional charges in this event. Display advertising will be sold in units of full pages (ad size 7" by 10", basic rate $100), and horizontal half pages (ad size 7" by 5", basic rate $55); back cover, $180; inside back cover $125. Classified advertising will be sold by the word (30 cents a word), with a minimum of ten words. The following discounts will apply to display advertising excluding cover space: 20% for a company with less than 50 employees and a publisher of books; 40% for a company of less than 20 employees. The closing date is Oct. 10 for the November issue, and Nov. 10 for the December issue.

5. <u>Who are our advertisers?</u> Our advertisers in recent issues have included the following companies, among others:

Alden Products Co.
Burroughs Adding Machine Co.
Computing Devices of Canada, Limited
Consolidated Engineering Co.
Electronic Associates, Inc.
General Ceramics and Steatite Corp.
Hughes Research and Development Labs.
International Business Machines Corp.
Laboratory for Electronics
The Macmillan Co.
Monroe Calculating Machine Co.
George A. Philbrick Researches, Inc.
Potter Instrument Co.
Reeves Instrument Co.
Remington Rand, Inc.
Sylvania Electric Products, Inc.

Sylvania Computer Crystal Diodes



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Please send me data sheets on Sylvania Computer Crystal Diodes.

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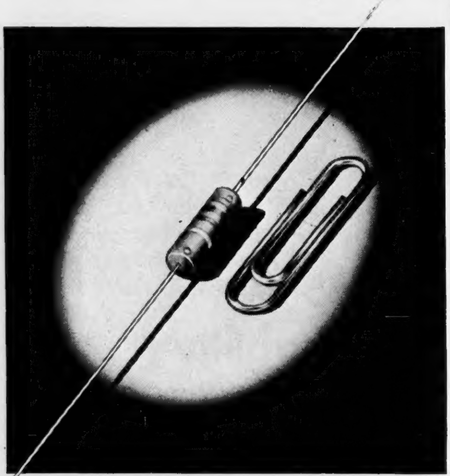
PROKAR® miniature molded CAPACITORS

. . . now <u>all</u> rated for operation at

125°C



NEW processing developments now make it possible for every Prokar miniature molded capacitor to be used at temperatures up to 125°C without voltage derating!

An exclusive Sprague solid dielectric and a mineral-filled phenolic jacket assure stable performance from −55°C to +125°C.

Ten mold sizes—ranging upwards from the .175" dia. x 5/8" long unit pictured actual size at left—give you maximum space economy in miniaturized equipments. Originally developed for military uses, the moderate prices of these miniature capacitors make them well worth your investigation also for use in dependable commercial electronic equipment. Write today for Engineering Bulletin 205F to the Sprague Electric Company, 377 Marshall St., North Adams, Massachusetts.

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